§ 177.1040 Acrylonitrile/styrene copolymer.

Acrylonitrile/styrene copolymers identified in this section may be safely used as a component of packaging materials subject to the provisions of this section.

(a) *Identity.* For the purposes of this section acrylonitrile/styrene copolymers are basic copolymers meeting the specifications prescribed in paragraph (c) of this section.

(b) *Adjuvants.* (1) The copolymers identified in paragraph (c) of this section may contain adjuvant substances required in their production, with the exception that they shall not contain mercaptans or other substances which form reversible complexes with acrylonitrile monomer. Permissible adjuvants may include substances generally recognized as safe in food, substances used in accordance with prior sanction, substances permitted under applicable regulations in this part, and those authorized in paragraph (b)(2) of this section.

(2) The optional adjuvants for the acrylonitrile/styrene copolymer identified in paragraphs (c) (1) and (3) of this section are as follows:

Substances	Limitation
Condensation polymer of toluene sulfonamide and formaldehyde.	0.15 pct maximum.

(c) *Specifications.*

Acrylonitrile/styrene copolymers	Maximum residual acrylonitrile monomer content of finished article	Nitrogen content of copolymer	Maximum extractable fractions at specified temperatures and times	Conformance with certain specifications
1. Acrylonitrile/styrene copolymer consisting of the copolymer produced by polymerization of 66–72 parts by weight of acrylonitrile and 28–34 parts by weight of styrene; for use with food of Type VI–B identified in table 1 of § 176.170(c) of this chapter under conditions of use C, D, E, F, G described in table 2 of § 176.170(c) of this chapter.	80 ppm[1]	17.4 to 19 pct.	Total nonvolatile extractives not to exceed 0.01 mg/in[2] surface area of the food contact article when exposed to distilled water and 3 pct acetic acid for 10 d at 66 °C (150 °F). The extracted copolymer shall not exceed 0.001 mg/in[2] surface area of the food contact article when exposed to distilled water and 3 pct acetic acid for 10 d at 66 °C (150 °F)[1].	Minimum number average molecular weight is 30,000.[1]
2. Acrylonitrile/styrene copolymer consisting of the copolymer produced by polymerization of 45–65 parts by weight of acrylonitrile and 35–55 parts by weigth of styrene; for use with food of Types, I, II, III, IV, V, VI (except bottles), VII, VIII, and IX identified in table 1 of § 176.170(c) of this chapter under conditions B (not to exceed 93 °C (200 °F)), C, D, E, F, G described in table 2 of § 176.170(c) of this chapter.	50 ppm[1]	12.2 to 17.2 pct.	Extracted copolymer not to exceed 2.0 ppm in aqueous extract or *n*-heptane extract obtained when 100 g sample of the basic copolymer in the form of particles of a size that will pass through a U.S. Standard Sieve No. 6 and that will be held on a U.S. Standard Sieve No. 10 is extracted with 250 mil of deionized water or reagent grade *n*-heptane at reflux temperature for 2 h.[1]	Minimum 10 pct solution viscosity at 25 °C (77 °F) is 10cP.[1]
3. Acrylonitrile/styrene copolymer consisting of the copolymer produced by polymerization of 66–72 parts by weight of acrylonitrile and 28–34 parts by weight of styrene; for use with food of Types VI–A and VI–B identified in table 1 of § 176.170(c) of this chapter under conditions of use C, D, E, F, G described in table 2 of § 176.170(c) of this chapter.	0.10 ppm (calculated on the basis of the weight of the acrylonitrile copolymer resin in the finished articles).[2]	17.4 to 19 pct.	Total nonvolatile extractives not to exceed 0.01 mg/in[2] surface area of the food contact article when exposed to distilled water and 3 pct acetic acid for 10 d at 66 °C (150 °F). The extracted copolymer shall not exceed 0.001 mg/in[2] surface area of the food contact article when exposed to distilled water and 3 pct acetic acid for 10 d at 66 °C (150 °F).[1].	Maximum carbon dioxide permeability at 23 °C (73 °F) for the finished article is 0.04 barrer.[3]

[1] Use methods for determination of residual acrylonitrile monomer content, maximum extractable fraction, number average molecular weight, and solution viscosity, titled: ''Determination of Residual Acrylonitrile and Styrene Monomers-Gas Chromatographic Internal Standard Method''; ''Infrared Spectrophotometric Determination of Polymer Extracted from Barex 210 Resin Pellets''; ''Procedure for the Determination of Molecular Weights of Acrylonitrile/Styrene Copolymers,'' and ''Analytical Method for 10% Solution Viscosity of Tyril,'' which are incorproated by reference. Copies are available from the Center for Food Safety and Applied Nutrition (HFS–200), 200 C Street SW., Washington, DC 20204, or may be examined at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408.

[2] As determined by the method titled ''Headspace Sampling and Gas-Solid Chromatographic Determination of Residual Acrylonitrile in Acrylonitrile Copolyemr Solutions,'' which is incorporated by reference. Copies are available from the Center for Food Safety and Applied Nutrition (HFS–200), 200 C Street SW., Washington, DC 20204, or may be examined at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408.

[3] As determined on appropriately shaped test samples of the article or acrylonitrile copolymer layer in a multilayer construction by ASTM method D–1434–82, ''Standard Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting,'' which is incorporated by reference. Copies are available from the Center for Food Safety and Applied Nutrition (HFS–200), 200 C Street SW., Washington, DC 20204, and the American Society for Testing Materials, 1916 Race Street, Philadelphia, PA 19103, or may be examined at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408.

(d) *Interim listing.* Acrylonitrile copolymers identified in this section shall comply with the provisions of § 180.22 of this chapter.

(e) Acrylonitrile copolymer identified in this section may be used to fabricate beverage containers only if they comply with the specifications of item 3 in paragraph (c) of this section.

[42 FR 14572, Mar. 15, 1977, as amended at 42 FR 48543, Sept. 23, 1977; 47 FR 11841, Mar. 19, 1982; 49 FR 36643, Sept. 19, 1984; 52 FR 33803, Sept. 8, 1987]

§ 177.1050 Acrylonitrile/styrene copolymer modified with butadiene/styrene elastomer.

Acrylonitrile/styrene copolymer modified with butadiene/styrene elastomer identified in this section may be safely used as a component of bottles intended for use with foods identified in table I of § 176.170(c) of this chapter as Type VI–B under conditions for use E, F, or G described in table 2 of § 176.170(c) of this chapter.

(a) *Identity.* For the purpose of this section, acrylonitrile/styrene copolymer modified with butadiene/styrene elastomer consists of a blend of:

(1) 82–88 parts by weight of a matrix copolymer produced by polymerization of 77–82 parts by weight of acrylonitrile and 18–23 parts of styrene; and

(2) 12–18 parts by weight of a grafted rubber consisting of (i) 8–12 parts of butadiene/styrene elastomer containing 77–82 parts by weight of butadiene and 18–23 parts by weight of styrene and (ii) 4–6 parts by weight of a graft copolymer consisting of 70–77 parts by weight of acrylonitrile and 23–30 parts by weight of styrene.

(b) *Adjuvants.* The modified copolymer identified in paragraph (a) of this section may contain adjuvant substances required in its production. Such adjuvants may include substances generally recognized as safe in food, substances used in accordance with prior sanction, substances permitted under applicable regulations in this part, and the following:

Substances	Limitations
n-Dodecylmercaptan	The finished copolymer shall contain not more than 500 parts per million (ppm) dodecylmercaptan as dodecylmercapto-propionitrile as determined by the method titled, ''Determination of β-Dodecylmercaptopropionitrile in NR–16 Polymer,'' which is incorporated by reference. Copies are available from the Center for Food Safety and Applied Nutrition (HFS–200), Food and Drug Administration, 200 C St., SW., Washington, DC 20204, or available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408.

(c) *Specifications.* (1) Nitrogen content of the modified copolymer is in the range of 17.7–19.8 percent.

(2) Intrinsic viscosity of the matrix copolymer in butyrolactone is not less than 0.5 deciliter/gram at 35 °C, as determined by the method titled ''Molecular Weight of Matrix Copolymer by Solution Viscosity,'' which is incorporated by reference. Copies are available from the Center for Food Safety and Applied Nutrition (HFS–200), Food and Drug Administration, 200 C St. SW., Washington, DC 20204, or available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408.

(3) Residual acrylonitrile monomer content of the modified copolymer articles is not more than 11 ppm as determined by a gas chromatographic method titled ''Determination of Residual Acrylonitrile and Styrene Monomers-Gas Chromatographic Internal Standard Method,'' which is incorporated by reference. Copies are available from